

growing in my study window, and for a week watched them and noted results. I made a careful observation four times every twenty four hours, viz: at 8 A. M., 12 M., 4 P. M., and 8 P. M. Indicator No. 1 was attached to a very young internode, while No. 2 was attached to one which had already elongated somewhat. The silk thread was carefully looped under the bases of the leaf stalks at the summits of the internodes, in such a way as not to produce a constriction of the stem. The record was kept in degrees of the arcs, and was transferred to profile paper, the horizontal distance representing time and the vertical the aggregate growth. In this way instructive diagrams were obtained for study and comparison. It was at once evident that the curve of growth for the day was much steeper than that for the night, the percentages ranging from day growth 59.6 and night growth 40.4, to day growth 52.2 and night growth 47.8. These figures can convey scarcely any idea of the constant and marked difference between the day growth and night growth as shown in the curve of growth upon the diagram. By modifying the attachment of the thread, by attaching several instruments to different internodes of the same plant, or by varying the treatment of the plant, as by increasing or decreasing the temperature, or the amount of water supplied to it, the pupil will be able to find out many interesting things about the growth of plants, with a little outlay of time, and none at all of money for apparatus. — C. E. BESSEY, *Ames, Iowa.*

TRICHOSTEMA PARISHI, Vasey. — Shrubby and much branched below, 2–3 feet high, canescently puberulent; leaves sessile, lance-oblong, 1–1½ inches long, tapering to a narrow base, obtuse, sparingly tomentose beneath, with fascicles of linear leaves with revolute margins in the axils; floral leaves 1 inch, gradually reduced to bracts. Thyrus 6–12 inches long, lower cymules 1–1½ inches apart, closer above, each consisting of 5 to 8 flowers, the peduncles 2 to 4 lines long, pedicels about 2 lines, the purplish wool of calyx scanty compared with *T. lanatum*. Corolla 5–6 lines long, the lower lobe rather longer than the upper, filament 9–12 lines long.

Differs from *T. lanatum* in the shorter and broader leaves, longer and more slender thyrus, with the cymules more open and much less woolly, the flowers smaller and filaments shorter.

Named for Mr. S. B. Parish, of San Bernardino, Cal., one of the discoverers. Found in San Diego Co., Cal., by *Mr. S. B. Parish* and *G. R. Vasey*. — GEO. VASEY.

BOTANY OF CALIFORNIA, VOL. II, by Sereno Watson. — The authors of this great work are to be congratulated upon its successful completion. The dress is admirable, with fine paper, clear type and broad margins, doing credit even to the famous University Press. The appearance of such a work always makes a stir in botanical circles, for it is a partial record of the progress of systematic botany up to the date of going to press. It is with peculiar satisfaction that we welcome this second volume, for it marks a completed work, and

our shelves are too much filled by those that are incomplete. Works upon Polypetalous orders are multiplied; Gamopetalæ have less of a showing; while Apetalæ and Monocotyledons are really poverty stricken. For some years hence our systematists in beginning their great works should scrupulously begin with Endogens and write their last volume first. The present volume carries the flora of California not only through Monocotyledons, but through Mosses. No state is so well provided with a botany as California, but it does not follow that all states should follow her example for it would be a useless expense and multiplication of books. No other state so well deserves a separate and complete botany. It naturally includes our whole Pacific coast and thus is the flora of a very distinct geographical area.

As usual the work of the volume has been parcelled out among specialists, Mr. Watson bearing the chief burden. Most of the changes in nomenclature have been made and the new species described before the issue of the present volume, being recorded in the proceedings of different scientific societies. But this sort of information is much scattered and the grouping together of the little changes of years gives a proper impression of the amount of work that has been done, and puts it into a usable form.

We will note some facts and changes that catch the eye in a hasty turning of the leaves, changes that for the most part are original with this volume.

Polygonum amphibium, var. *terrestre* becomes *P. Muhlenbergii*. Of the 102 known species of *Eriogonum*, 55 have already been found in California. Two species belong to the South Atlantic States, two to Mexico and the rest of the genus is found between the Mississippi and the Pacific.

Cheopodium is made to include *Blitum*, and *B. maritimum* of the Manuals is *C. rubrum*.

A near relative of *Dirca palustris* has at last been found and called *D. occidentalis*. Our Sycamore is represented in California by *P. racemosa*. Several new Euphorbias come from the safe hands of Dr. Engelman, who also now recognizes as species what ranked before as varieties of *Quercus lobata* and *Q. chrysolepis*. These new oaks bear names that repeatedly appear in California botany, viz.; Drs. Brewer and Palmer. *Taxaceæ* appear as an order distinct from *Conifereæ*, and *Abies* is so broken up that for a time we can hardly get our bearings. For *Abies Douglasii* we must say *Pseudotsuga Douglasii*; *Abies Menziesii* is *Picea Sitchensis*; while other well known species of *Abies* appear under the generic name of *Tsuga*.

The abundant and well known *Pinus ponderosa* of the Rocky Mountains is now only the variety *scopulorum* of the true *P. ponderosa*. Out of eight Californian *Habenarias* Mr. Watson names six, and out of the 23 *Alliums*, 15 must look for their author to the same indefatigable worker.

The many changes and additions among the *Liliaceæ* were fully noted in the GAZETTE for August, 1878, in a review of Mr. Watson's "Revision of N. A. Liliaceæ."

The "Skunk Cabbage" of California rejoices in the name of *Lysichiton Kamtschatcensis*.

Lemna Torreyi of the Manual is *L. Valdiviana*, Philippi; and we are reminded that *L. polyrrhiza* was long since changed to *Spirodela polyrrhiza*.

Two genera of palms are described, *Washingtonia* and *Erythea*.

Of the genus *Carex* we find 78 species, some 10 or 11 being described here for the first time by Mr. Wm. Boott.

We confess to a good deal of interest in looking over the *Graminæ* by Dr. Geo. Thurber. Not so many changes appeared as we had anticipated and we were glad to see that the ordinary terms were employed and not those involving theoretical views of the structure of the flowers. Several new species are well distributed among as many genera. *Brizopyrum spicatum* appears as *Distichlis maritima*.

Ophioglossaceæ appears as an order distinct from *Filices*. The progress in our knowledge of the classification of Ferns has been noted from time to time in reviews of Prof. Eaton's great work.

The genus *Azolla* instead of, as usual, appearing under the order *Marsiliaceæ*, is separated under the order *Salviniaceæ*.

That the flora of California has not been exhausted is witnessed by the fact that during the four years that have elapsed between the publication of the two volumes, new material enough has been collected to make over 60 pages of "Additions and Corrections." In these 60 pages of course we find the very latest information. The California *Trautvetteria* is made a distinct species and now the genus stands with three species, one on the Atlantic coast, one on the Pacific, and one in Japan. A new species is described under *Dicentra*, *Corydalis*, *Trifolium*, *Rosa*, while *Draba* has three additions. A new genus of *Crucifere* is dedicated to Mr. Leland Stanford, one of the patrons of the "Botany of California." It is called *Stanfordia*. A good many *Composite* are added, largely the result, we suppose, of Dr. Gray's recent study of that vast order. On page 485, *Erythea*, Mr. Watson's genus of Palms, is unfortunately printed *Erythraea*, which makes it look too much like *Erythraea*.

All botanists should possess this complete work which is exceedingly cheap when we consider the matter and workmanship. By addressing Mr. Sereno Watson at Cambridge, Mass., botanists can procure either or both volumes at \$5.00 each. — J. M. C.

FRANCIS DARWIN ON PHYSIOLOGY OF PLANTS.—Abstracts of two important papers read by Francis Darwin before the Linnean Society, appear in *Nature* for Dec. 23.* "Both bear on the relationship between the external and internal conditions of life, between external forces such as light and gravitation, and the constitution of the organism on which these forces act."

I. The behavior of leaves under the action of light may be illus-

*I. "The Power possessed by Leaves of placing themselves at Right Angles to the Direction of Incident Light." II. "The Theory of the Growth of Cuttings, illustrated by observations on the Bramble, *Rubus fruticosus*."